



Integrated Grid: Methodology and Tools for Optimizing DER Location

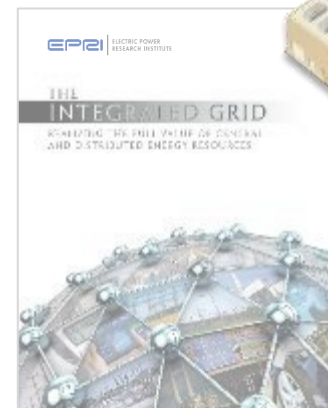
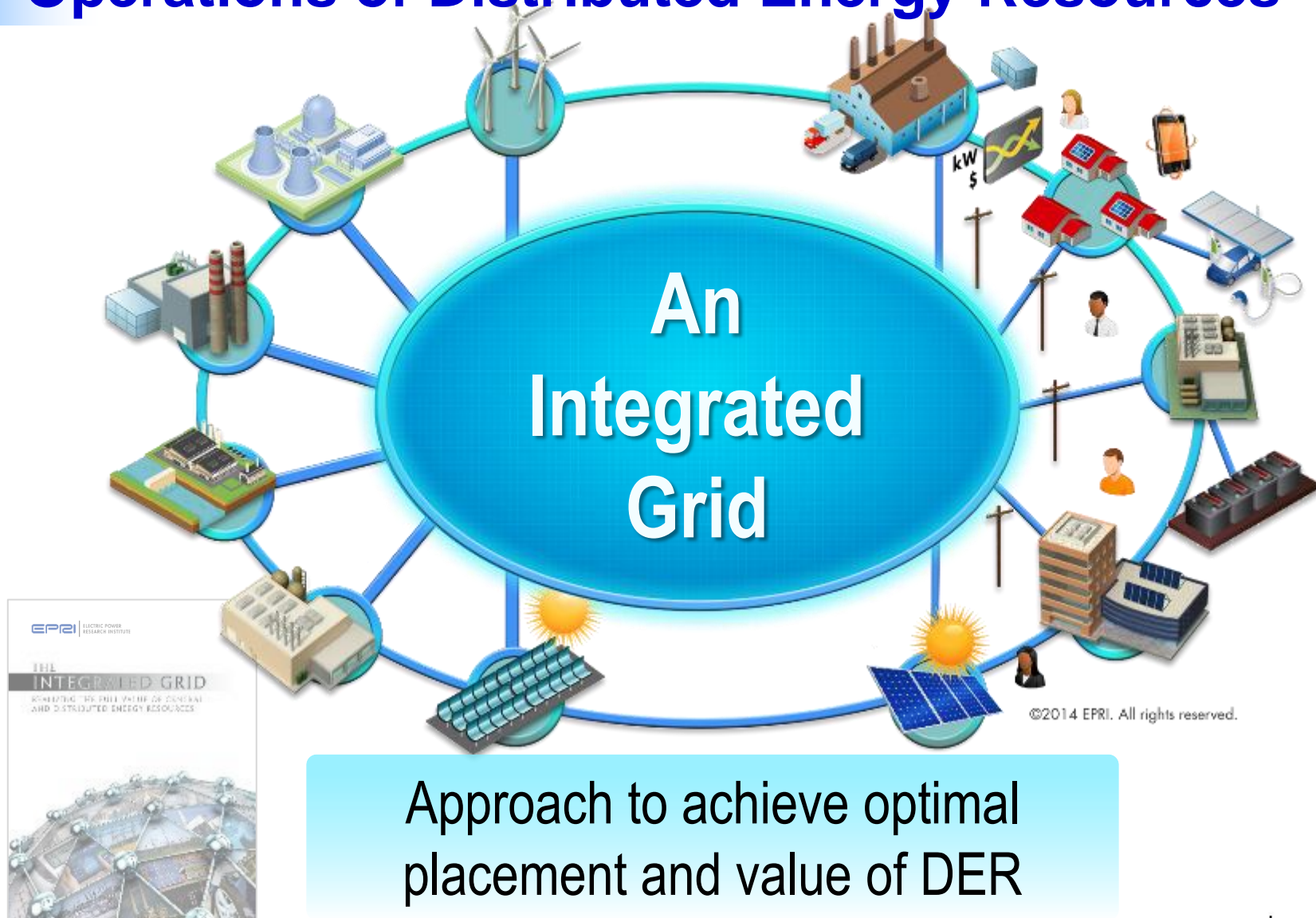
Ben Kaun

Senior Project Manager

CPUC DRP Workshop (R. 14-08-013)

08 January 2015

New Frameworks Needed for Planning and Operations of Distributed Energy Resources

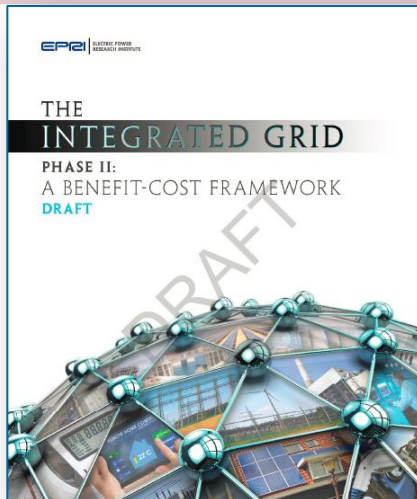


Timeline of EPRI's Integrated Grid Effort

Phase I
Concept Paper
Feb 2014

Phase 2
Benefit/Cost
Framework
Early Feb 2015 final

Phase 3
Pilot Deployments
2015 -



Distribution Systems are Unique and Large in Scale

Distribution Feeders are Unique

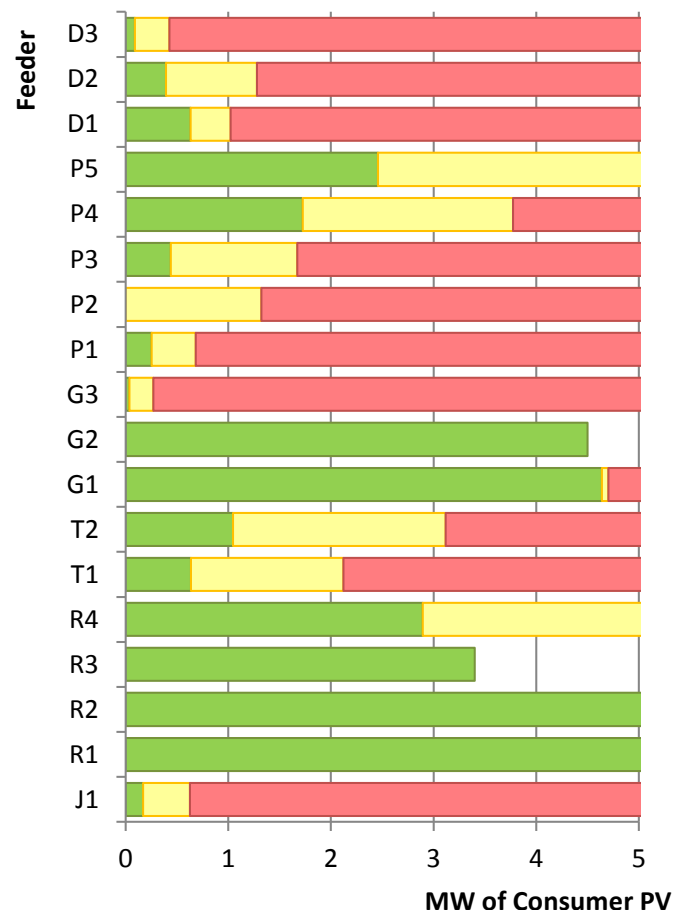
- Designed to reliably serve ALL customers in least-cost manner
- Evolve around customer needs
- Feeder design impacts reliability, costs, and benefits of DER

Distribution Systems are Vast

Typical Distribution Utility	Number
Service Territory	1
Planning area	1's - 10's
Substations	10's - 100's
Feeders	100's -1000's
Service Transformers	1000s - 1,000,000's
Customers	100,000's - 1,000,000's

Decreasing visibility

Ex: PV Hosting Comparison by Feeder



Criteria for Effective Distribution Planning Methods Incorporating DER

Granular

- Capture unique feeder-specific responses

Repeatable

- Across any and all distribution feeders

Scalable

- Throughout entire distribution system for aggregation and system-wide assessment

Transparent

- Clear and open methods for analysis

Proven

- Validated techniques for system performance assessments

Available

- Utilize readily available utility data and tools (can vary from utility to utility, feeder to feeder)

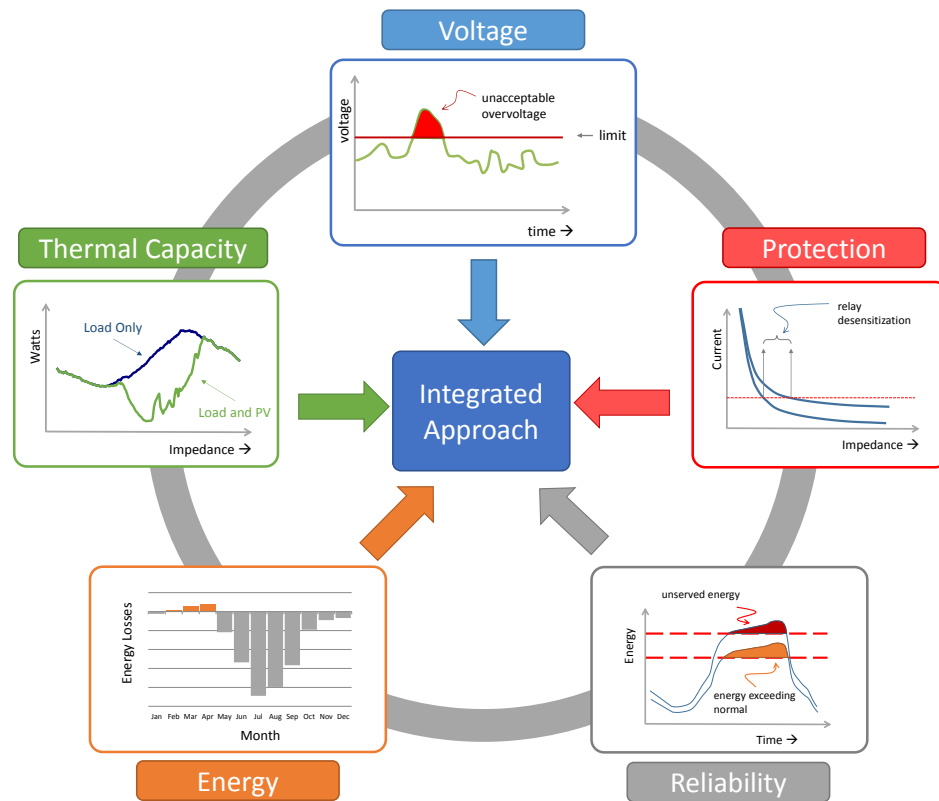
Goals to Maximize Value of DER

- **Goal 1: Minimize Cost**

- Avoid driving new capital upgrades with DER
- Maintain voltage, protection, thermal capacity, and reliability standards

- **Goal 2: Maximize Benefit**

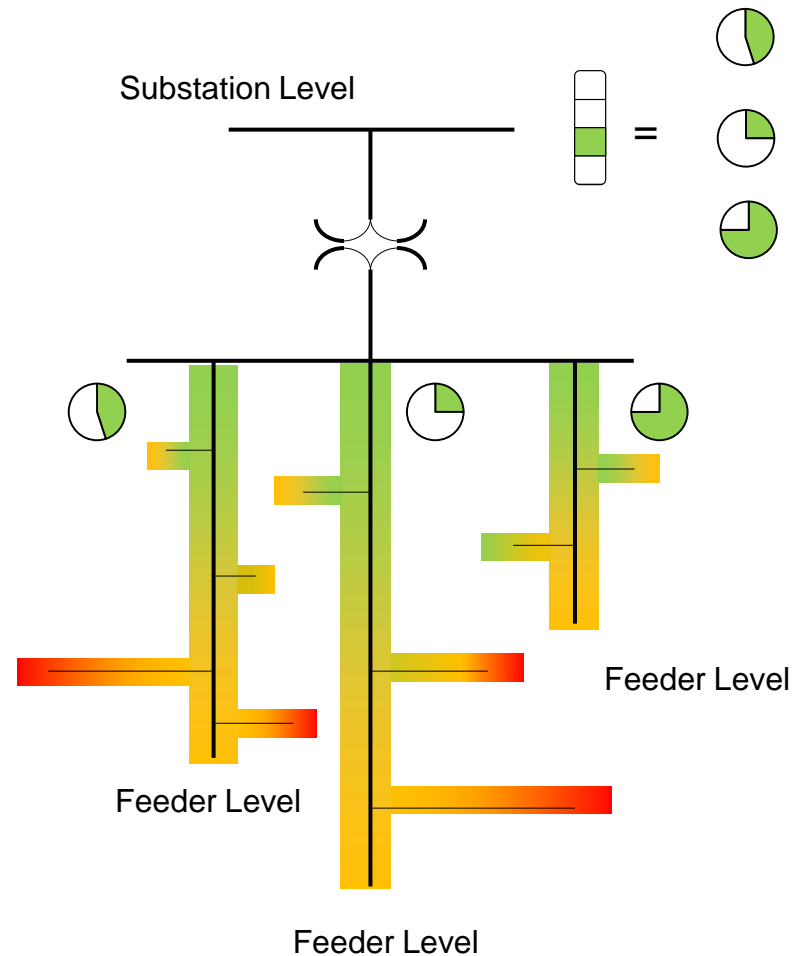
- Defer or avoid planned capital upgrades
- Improve system efficiency
- Enhanced power quality, reliability, and resiliency



Components for determining optimal type and location of DER

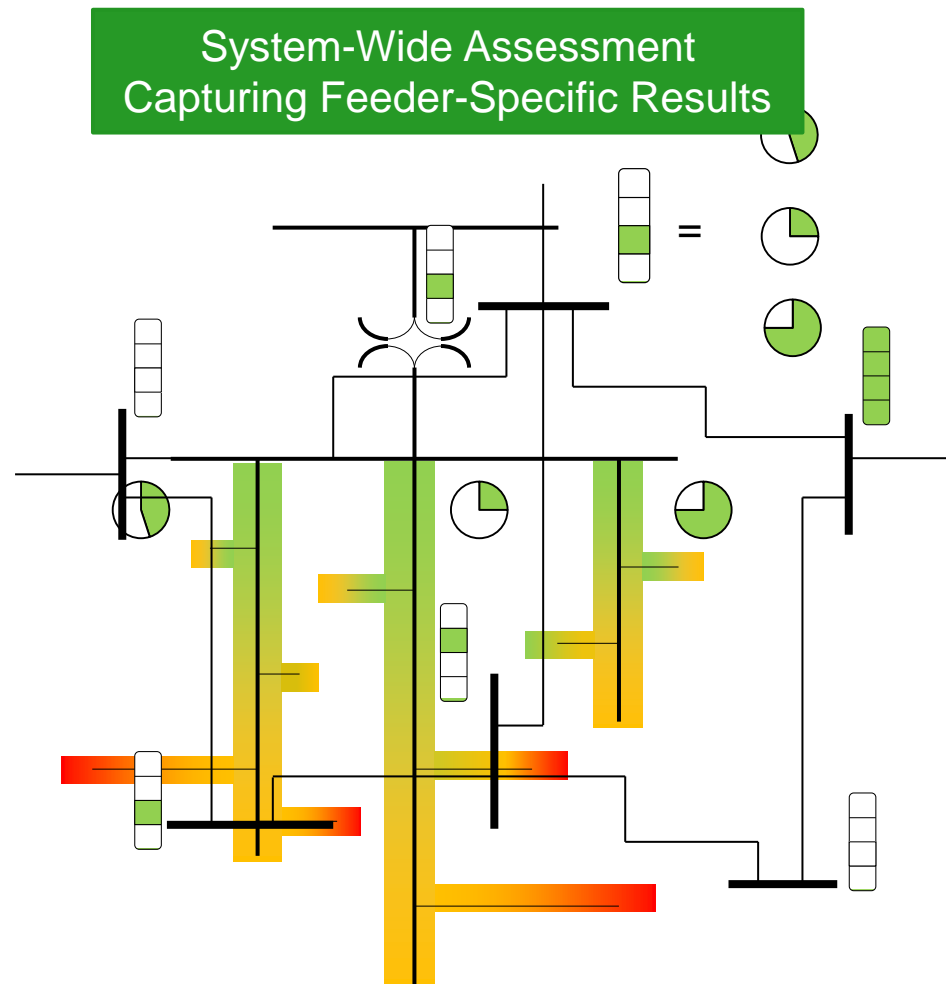
EPRI Approach to Distribution Planning with DER

- Leverage deep insights and findings from rigorous analysis (OpenDSS)
- Streamlined utility implementation
 - Utilize current utility planning tools and data
 - Evaluate each feeder individually
 - Apply throughout entire system (1000's of feeders) in automated fashion
 - Consider “feeder-level” response with results that can be aggregated up to substation level
- **EPRI is currently beta-testing implementation in CYME and will be developing in SynerGEE in 2015.**

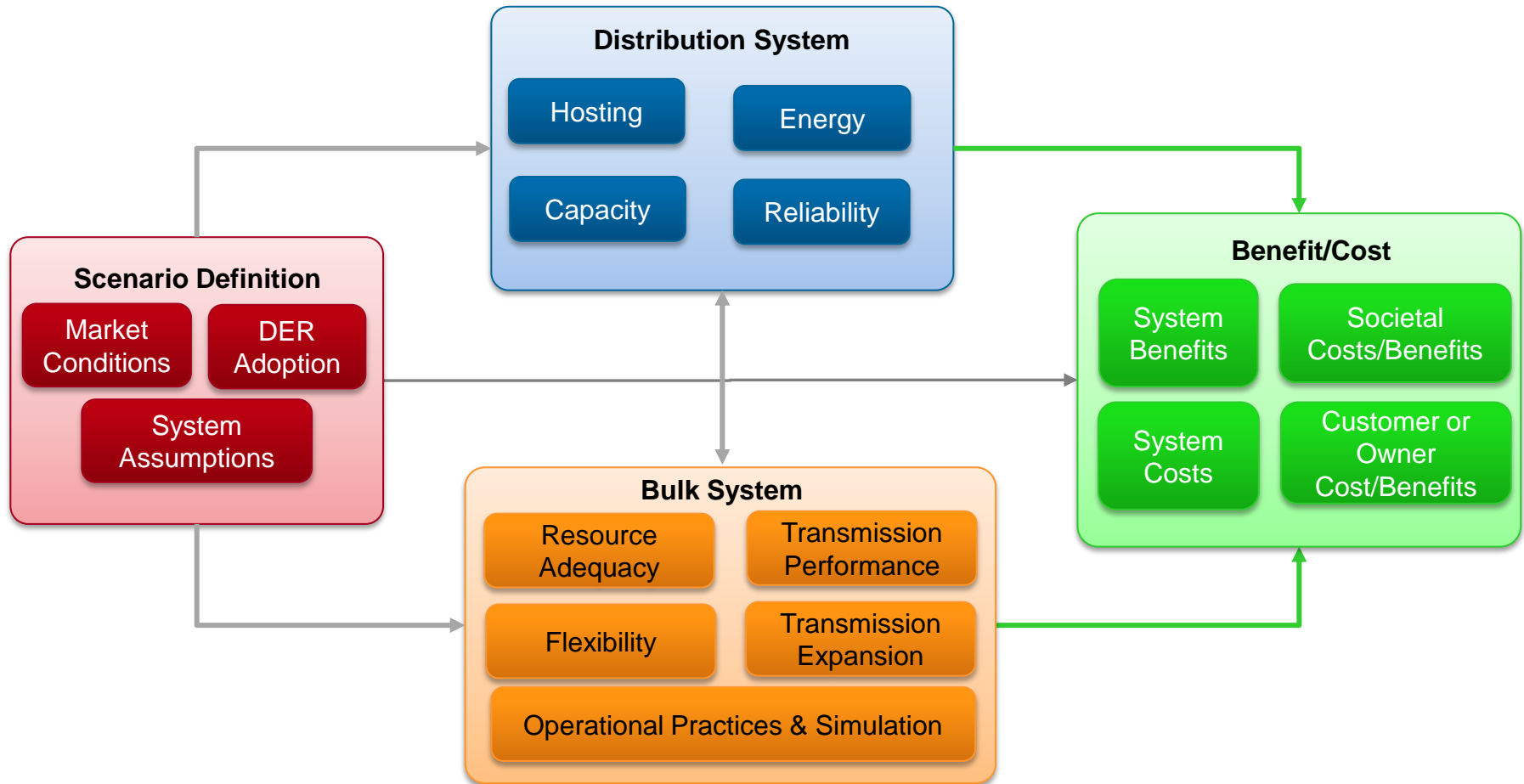


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Beyond Distribution: Integrated Grid CBA Spans Multiple Domains and Stakeholders

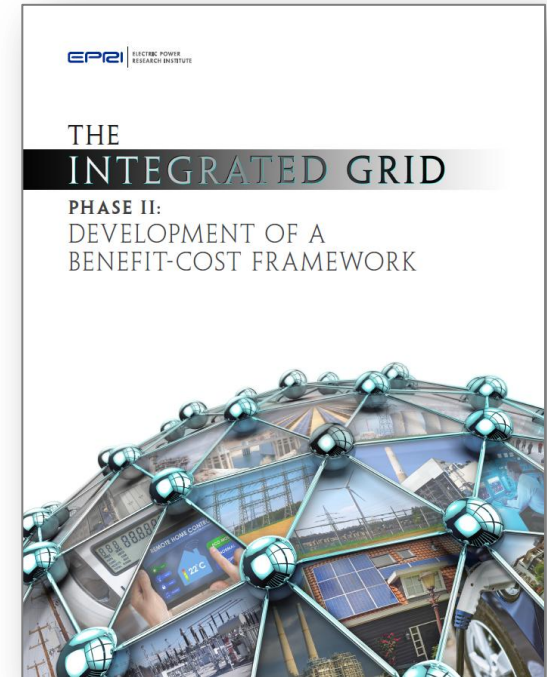


Related Efforts: Energy Storage Integration Council (ESIC) and Model Development

- Goals
 - Develop detailed methodologies and tool requirements for analysis of distribution-connected energy storage
 - Develop a cloud-hosted, public software tool for energy storage valuation and optimization
 - CEC 13-302 NOPA: Project start expected March 2015
- Build off EPRI Integrated Grid and NREL Distributed PV modeling frameworks
- Open, collaborative effort with utilities, energy storage industry, and analysts
- Next ESIC Analysis Working Group Teleconference: January 30
 - E-mail Ben Kaun, bkaun@epri.com, for ESIC registration and invitation (no cost)

Wrap-Up: Approach for Optimizing DER

- A robust DER planning approach
 - Considers diverse resource options and locations
 - Acknowledges systems and feeders are diverse and unique
 - Is practical and scalable
 - Is transparent and validated
- EPRI approach and roles
 - Provide technical guidelines
 - Provide technical reviews of implementations
 - Implement new methods with existing software / data where possible
 - Promote (inter)national technology transfer





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